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Epidemiology of Tuberculosis.—The study is based on 10,929 patients examined in the Middlesex County Sanatorium, Massachusetts, during the years 1931–1938. Of these, 1,220, or 11.1 per cent, were actively tuberculous. Of the total patients examined, 5,334 were in household contact with an active case of tuberculosis. It was found that the attack rate of contacts of consorts was lower than when the source case was a sibling, mother or father of the contact. Females in contact with active tuberculosis were more frequently attacked by the disease than males. Practically all cases of tuberculosis were diagnosed on first examination; the rate of subsequent development of tuberculosis in patients negative on initial examination was the same as that of the general population. All the members of 479 households, each having a single living individual with active tuberculosis, were examined. The total tuberculosis morbidity among the contacts was 7 per cent. The morbidity rate was higher among the female than male contacts up to the age of thirty years. The mortality rates for six years following initial examination were: minimal 5 per cent; moderately advanced 11 per cent; far advanced 48 per cent.—*Some Epidemiological Aspects of Tuberculosis Determined by Analysis of Sanatorium Records, R. M. Seideman, Am. J. Hyg., July, 1943, 33: 780.*—(*M. B. Lurie*)

Tuberculosis in Households in Williamstown County, Tennessee.—Five hundred seventeen household associates of 138 fatal and sputum-positive index cases and 1,577 associates of 398 non-sputum-positive, manifest or latent tuberculous index cases have been observed for nine years. It was found on first examination that the incidence of manifest tuberculosis of associates of sputum-positive individuals was 7.6 per 1,000; this incidence was 2.4 per 1,000 among associates of sputum-negative cases. The incidence of tuberculosis in colored household associates was three times higher than in white households. Tuberculosis death rates and death rates from all causes were much higher in colored households. During the first six years of observation, 5.5 per cent of the associates of fatal and sputum-positive index cases and 1.4 per cent of the associates of sputum-negative cases developed tuberculosis. A greater proportion of associates of sputum-positive index cases, originally free from tuberculosis or having only the primary disease, developed manifest tuberculosis later on than similar associates of sputum-negative index cases. Similarly calcium deposits developed more frequently among associates of sputum-positive index cases. Calcium deposits developed only in those individuals who were less than fifteen years at the first examination. —*Tuberculosis Studies in Tennessee—Morbidity and Mortality in White Households during the Period of Observation, H. C. Stewart, R. S. Gass, Ruth R. Puffer & W. C. Williams, Am. J. Hyg., March, 1943, 37: 193.*—(*M. B. Lurie*)

Epidemiology in a Village.—In 1936 it was noted that many cases of erythema nodosum occurred among the school population of La

Vyneuve, a village of 700 population in the mountains of the Swiss Jura. Out of 120 pupils between six and sixteen, 40 per cent had positive Pirquet tests, 11 had intrapulmonary tuberculous lesions on X-ray and, including the cases of erythema nodosum, there were 17 students with manifest tuberculosis. A thorough investigation was started in 1941 when it became evident that there were 4 open cases of pulmonary tuberculosis in a company which had been mobilized in 1939, and it was found that all young men of military age from La Vyneuve were in this company. The commission was able to examine 98.3 per cent of the village population. The Pirquet test was positive in 53 per cent, with the following age distribution: at five years, 16 per cent were positive; at nine years, 30 per cent; at eleven, 50 per cent; at sixteen, 55 per cent. Between the ages of twenty-five and twenty-nine, 60 per cent reacted positively, and between the ages of fifty and fifty-four, 80 per cent were reactors. Fluoroscopy showed 21 cases of active tuberculosis, also 17 cases of healed tuberculosis which had left considerable evidence in the lungs, and 50 cases of healed disease with slight evidence of former disease. In other words, 13.4 per cent of the population showed some evidence of tuberculosis on X-ray. Of the 21 active cases, only 9 were known to the authorities before the survey was started. The remaining 12 cases were composed of the following types of lesions: one extensive haematogenous pulmonary tuberculosis, 2 cases with cavities, 2 infiltrations, one infiltration with tuberculous cervical nodes, 4 cases with active hilar lymphadenitis and 2 cases of tuberculous subclavicular adenitis. The rate in this small village is, therefore, 32 per 1,000, whereas in the United States it is less than 3 per 1,000. The deaths per 10,000 population in all of Switzerland are 7.8 from tuberculosis, as compared to 22 per 10,000 in this village. The percentage of tuberculosis deaths per 100 total deaths in Switzerland is 6.5, in La Vyneuve it is 14.6. The main factor in disseminating the disease is contagion within families. The people do not understand the contagiousness of the disease and take no or inadequate precautions. The question of the rôle of tuberculous cattle in this region cannot be answered readily. A survey in 1940 showed an incidence of 2.48 per cent of tuberculosis among the cattle of Vaud, the canton in which La Vyneuve is situated, and of all tuberculous cattle 12 per cent had tuberculous udders. Similar figures regarding tuberculosis in cattle are obtained throughout Switzerland.—*Notes sur l'épidémiologie tuberculeuse d'un village du Jura Vaudois, C. Benzençon, G. Cornu, H. Pache, P. Rochat & E. Urech, Schweiz. med. Wchnschr., June 12, 1943, 73: 782.*—(*H. Marcus*)

Tuberculosis Endemic.—An outbreak of tuberculosis in a unit of 248 officers and men affected 17 individuals within seventeen months. The quick spread and the malignant character of the endemic was chiefly due to three factors: Most of the patients came from rural districts and this was their first contact with tuberculosis. Second, they were in contact with the source, the open cases of tuberculosis, from six to twelve months before the sources were recognized and hospitalized. Third, the unit was immunized with three typhoid-paratyphoid injections in March, 1940, and the disease of 7 patients had its onset within a month of the last injection. Of these 7 cases, 4 ended in generalization and death, and this malignant course suggests an aggravation of the immune-biological reaction of the patients by the series of immunization injections. The types of disease found among the primary infections were as follows: simple primary infiltration with slight perifocal reaction of the pleura, primary infiltration with early haemoptysis, primary infiltration with generalization and meningitis, primary infiltration with protracted dissemination and meningitis, primary infiltration with breakdown and production of open phthisis. Ten out of 17 cases had exudative pleuritis as their first symptom. This is such a frequent finding in the late primary infection of young adults that it should be regarded as proof of primary infection until proven otherwise, and

it is the duty of the troop physician to search for the source in any unit where one or more members have developed it. In this unit the source was a thirty year old soldier with open tuberculosis. He was discovered and hospitalized one and one-half years after the unit was activated, and eight months after the onset of his own symptoms. A subsidiary source with cavitary tuberculosis was discovered about the same time. His symptoms antedated the diagnosis by approximately ten months. In this endemic of 17 cases there were 4 deaths, and one case of progressive primary tuberculosis with doubtful prognosis. The other cases recovered but their hospitalization time was up to twenty-two months in one case.—*Tuberkulose und Armee im Aktividienst 1939 und folgenden Jahren, Bericht über eine Tuberkulose-Endemie in einer F. Bttr., E. Uehlinger, Schweiz. med. Wchnschr., June 12, 1943, 73: 769.*—(*H. Marcus*)

Prophylaxis of Tuberculosis.—No obvious reason is found for the increase of incidence and severity of tuberculosis in Switzerland. The food shortage may play a certain rôle, or more cases may have become apparent since the mobilization in 1939. Although education of the public must be continued, it is not considered of great value in preventing the spread. At this time, medical prophylactic measures, strictly executed, are far more important. The most important single factor is a complete record system. Every known case must be on file there, and every new case must be reported to the central agency promptly, whether it comes from civilian life or from the military authorities. It is the duty of this central authority to provide hospitalization for those in need of it, and to see that contact examinations are carried through. Whenever a primary case of tuberculosis is reported contact examinations must find the source. Whenever an open postprimary case is reported it must be determined by contact examinations if he has been the source of spread. If a period of waiting has to precede hospitalization, suitable arrangements have to be made to avoid infection of others in the same household. Military personnel is retained in hospitals and not sent home prior to institutionalization. When the patient is in the sanatorium, weekend passes should not be issued to him unless he is negative. Those discharged from sanatoria with a positive sputum should work under special conditions, if they are able to. Their homes should be arranged accordingly. If the patient is discharged negative, a graduated work program under special supervision will help in maintaining the good results of the cure. If the patient can thus be tided over the first four years after discharge, his chances of remaining well are excellent. Fluorographic surveys of the entire population is a desirable goal of the near future.—*Gedanken zur Tuberkulose-Prophylaxe, E. Bachmann, Schweiz. med. Wchnschr., June 12, 1943, 73: 787.*—(*H. Marcus*)

Tuberculosis Control in Chicago.—Municipal control of the Chicago tuberculosis program is centered in the Municipal Tuberculosis Sanitarium, an organization consisting of a 1,200 bed sanitarium, 260 bed suburban branch, 7 clinics and 5 field pneumothorax stations. Case reporting is compulsory. Follow-up and presanitarium care are handled by 44 physicians and 144 field nurses. The noncoöperative open case still presents a problem since existent legislation is inadequate. Compulsory examination of school teachers has not been possible. April 1, 1943, Chicago had 1,417 open cases in hospitals and sanitoria and 1,290 cases in their own homes. Of the latter, only 31 were in contact with children and these were in process of clearance. Collapse therapy is used as an instrument of control as well as a type of treatment. There are 1,646 cases receiving pneumothorax in out-patient clinics in Chicago. In 1937, of 1,702 cases with positive sputum subsequently treated with collapse and still living in 1943, 1,215, or 71.4 per cent, were completely converted, 70, or 4.1 per cent, were incompletely converted, while 417, or 24.5 per cent, were still positive Of 167,345 children tuberculin tested over a three-year

period, 13 per cent of the elementary group, 22 per cent of the high school group and 33 per cent of the college group were reactors. Among the 23,532 reactors who were X-rayed, 218 cases of reinfection tuberculosis were found, 50 per cent of whom were moderately or far advanced. An additional 107 cases were uncovered later in reraying suspicious cases, while 226 cases were found in checking the homes of reactors. In view of the time consumed, the volume of follow-up and the cost, these results were not considered satisfactory. In following the reactors into their homes, it was found that, of 3,284 instances, 3,058 were already on the register, confirming the Board's feeling that close supervision of tuberculosis contacts represents a more practical effort than routine examination of school children. The 4 x 5″ film is now used in surveying. A mobile unit was housed in various Negro and slum areas, relief clients were X-rayed, and now the unit is concerned chiefly with the examination of factory employees. Up to May 1, 112,000 had been X-rayed, of whom 74 per cent were adults, 34 per cent white. To date 4,071 cases have been found, a rate of 4 per cent for adults and 0.3 per cent for children. On the basis of race, 4.9 per cent were whites as against 2.7 per cent Negroes. The factory survey is yielding less than 1 per cent. Regarding stage of disease, 52 per cent of cases found have been minimal, 35 per cent moderately advanced, and 13 per cent far advanced. The photoroentgenographic survey will remain as a permanent feature of the case-finding program. BCG vaccination was begun about 1937 after careful research. To date over 2,000 persons, mostly infants, have received the vaccine. Of the equal number of controls, 5 have developed tuberculous bronchopneumonia of which 2 have died, while several others have shown X-ray evidence of tuberculosis. No case in the vaccinated group has developed any sign of the disease.—*Experiences in a Program for the Control of Pulmonary Tuberculosis in Chicago, R. Davison & E. P. Troy, Dis. of Chest, January–February, 1944,* ***10:*** *54.*—(*K. R. Boucot*)

Procedures in Tuberculosis Control.—In the face of decreasing personnel, the increasing demands upon tuberculosis clinics must be met by husbanding of all resources and by the elimination of all unproductive procedures. Those in charge of tuberculosis control must first define their objectives and devise the proper procedures for their attainment. It is essential that all collaborators are thoroughly cognizant of both. The principles adopted by the Bureau of Tuberculosis of the Department of Health of New York City are outlined in this paper. It is believed that any tuberculosis clinic can benefit by the experience of this Department. For exact objectives and methods used the reader is referred to the original paper.—*Simplified Procedures in Tuberculosis Control, H. R. Edwards & A. B. Robins, Am. J. Hyg., May, 1943,* ***33:*** *517.*—(*M. B. Lurie*)

Socio-economic Aspects of Tuberculosis.—The prevalence of pulmonary tuberculosis in selectees is correlated with socio-economic level, population, density, nationality and industries of the communities from which they came. Of the selectees who were studied roentgenographically at the Boston Armed Forces Induction Station from December, 1940 until early in 1943, 0.9 per cent were found to have pulmonary tuberculosis. The method of study is outlined. The incidence of tuberculosis increased from 0.7 per cent in the best communities to 1.4 per cent in the poorest. Variations in population densities under 5,000 per square mile failed to influence the tuberculosis rate but in greater densities the rate increased, progressing from 0.6 per cent at population densities of 5,000 to 1.4 per cent at population densities of over 20,000 per square mile. The increased rate of tuberculosis in these higher densities of population appeared to be due to crowding *per se* and not merely to the lower socio-economic level of the congested areas. Irish communities showed the highest tuberculosis rates but these figures were no higher than expected on the basis of their high population density and low desirability irrespective of nationality.

Hence, nationality was not found to be a factor in tuberculosis rate. Nor was there any specific relation between community occupation and tuberculosis.—*Socioeconomic Aspects of Disease, R. W. Hyde & D. Zacks, New England J. Med., November 25, 1943, 229: 811.*—(*J. Ballinger*)

Tuberculosis among Children.—Between May 31, 1921 and November 1, 1941, 5,537 children from birth to five years of age were seen at the tuberculosis clinic at the Lymanhurst Health Center. During the first ten-year period, tuberculin tests (Pirquet) were done on 2,366 children; of these, 1,680 (71 per cent) did not react to tuberculin, 489 (20.7 per cent) reacted, in 197 (8.3 per cent) there was a questionable reaction. During the second ten-year period, tuberculin tests were done on 3,109 children; of these, 2,764 (88.9 per cent) did not react, 342 (11 per cent) reacted, in 3 (0.01 per cent) there was a questionable reaction. These figures show that there was a definite decrease in the incidence of tuberculosis from the first to the second period of observation. The tuberculin test in this age group fails only (*1*) during the preallergic stage, (*2*) in acute reinfection forms of the disease, (*3*) when a poor quality of tuberculin is used and (*4*) when the test is not properly administered. In the 813 reactors to tuberculin, chest X-ray films were taken; in 401 (49.32 per cent) no lesions were found, 102 (12.54 per cent) presented evidence of first infection type of tuberculosis in the pneumonic stage. The prognosis of the primary type of tuberculosis is excellent. The reinfection type of the disease rarely occurs before the age of twelve years. Among the 813 reactors, 2 died from tuberculous pneumonia, 4 from tuberculous meningitis, and 5 from generalized miliary tuberculosis; 9 developed bone and joint tuberculosis, one tuberculosis of the adenoids, and one of the cervical lymph nodes. Nine developed several years later the reinfection type of tuberculosis. Among the children who did not react to tuberculin on the first examination, 198 were found subsequently to be reactors. Of these, one died from tuberculous pneumonia and 2 from tuberculous meningitis; 2 developed bone and joint tuberculosis and 3 chronic pulmonary tuberculosis. Among the 1,673 children who remained nonreactors to tuberculin throughout the period of observation, there was not a single case who was found to have clinical tuberculosis in any form. Among these, evidence of calcium deposits was found in the chest of 15, but the first infection type of disease in the pneumonic stage was not found in a single child.—*Tuberculosis among Children of Pre-School Age, F. E. Torres, J. A. Myers & F. E. Harrington, Journal-Lancet, March, 1944, 64: 67.*—(*G. C. Leiner*)

Fluoroscopy and X-ray Damage.—Fluoroscopic surveys of large groups, both in the Army and in civilian life, necessitate a careful appraisal of the dangers of constant exposure to X-rays. Physicians doing the fluoroscopic work spend eight hours daily in the darkroom, as may also be the case for assistants who direct the patients to stand behind the screen and regulate the patient traffic. The safe limit for an eight-hour day is a dose of 0.25 r. It is immaterial whether this dose is absorbed in one hour or in the course of eight hours. It still constitutes the safe limit for one working day, bringing the yearly tolerance level up to 75 r. This tolerance dose is larger than the usual doses that physician or assistants are subjected to in the darkroom because of the employment of protective devices. However, in clinics where not every effort is made to employ all known protection, to check equipment frequently and to instruct the personnel properly, X-ray damage may become a serious problem. The germ plasm alone does not have the power to recuperate after X-ray damage. All dosage directed against it acts in a cumulative fashion over the years of exposure, and no regeneration ever takes place. Students of heredity and eugenics fear that X-ray may produce an adverse effect in the offspring of those exposed for generations to come. To verify this work observation of several generations is needed. However, all other tissues have

the power to recuperate. The factors determining the rate and speed of recuperation are: the single dose, the interval between exposures, the total time over which exposure took place, and the kind of tissue affected. In all X-ray and fluoroscopic work, a 0.5 mm. Al filter should be used to eliminate the useless soft rays which constitute a real danger. The patient himself is the best protection for the physician, since he absorbs 95 per cent of the primary radiation. Ordinarily the physician need never expose himself to the primary rays, since a good fluoroscopic screen, and the two factors mentioned above, should take care of all the primary radiation. Manipulation of the patient behind the screen with unprotected hands is extremely dangerous and should be avoided altogether. In fluoroscopy of the chest the need for this is extremely small. The skin dose of the fluoroscoper holding the screen with gloves is 0.03 r, whereas without gloves it is 1 r. The danger to the personnel comes from the secondary radiation, the source of which is the patient. From the patient the secondary radiation scatters equally in all directions, but is strongest nearest to the patient and decreases with the square of the distance. If unprotected personnel must be kept in the room at all they should be placed as far away from the patient as possible. The skin dose for the body of the physician without protection is 3 r, with lead apron it is 0.03 r. At a distance of one meter from the patient, where the control table is usually placed and an assistant is most likely to stand, the skin dose is 0.3 r. Anybody standing within this or even larger distance should, therefore, wear a rubber-lead apron. In addition, the dosage can be cut down through the practice of ray economy. The screen aperture should be narrowed down as much as possible, and only small fields of the chest examined at a time. Fluoroscopy should be done with a kilovoltage of from 55 to 65, and the use of more than 3.5 milliamperes is to be condemned. In addition to these measures, the time of exposure can be shortened by making sure of a good adaptation before beginning fluoroscopy, and by maintaining absolute quiet in the room, so that nothing may detract the fluoroscoper and so increase the exposure time.—*Kritische und kasuistische Beitrage zum Thema: Reihendurchleuchtung. Zur Frage der Strahlengefahr im Beleuchtungsbetrieb, H. H. Weber, Schweiz. med. Wchnschr., October 9, 1943, 73: 1252.—(H. Marcus)*

Fluoroscopy in Army.—Compensation paid by the Swiss Army Compensation Organization amounts to more than six million dollars yearly. About one-third of this amount is paid for claims arising from tuberculous disease. The sanatorium cost per patient is from $1,500 to $2,000 yearly. Individual cases may run up to $10,000 in one year. A great many of these expenses could be saved if an objective report on the condition of the lungs of recruits entering the Army were at hand. This will prevent the Army from accepting those with existing tuberculosis and shifts the responsibility for these people to the civilian agencies. Through these, arrangements can be made to have the patient cured at a fraction of the cost, because the disease is detected at an earlier stage. Also, new infections of Army personnel can be prevented by excluding those who have the disease. These considerations led to the adoption of the universal fluoroscopy of recruits entering the Army, and of men recalled to the service for further duty. Up to that time physical examination alone was relied upon to detect abnormalities in the chest, but this only revealed cases of chronic fibrocavitary disease, never the early infiltration or the recent cavity. The question arose how effective fluoroscopy is in excluding tuberculous patients. It is essentially a subjective method, depending on the observer. Optimum conditions can be created by regulation of the milliamperage, the voltage, by providing a good quality, new fluoroscopic screen, and by regulating the size of the focal spot. In spite of making use of every known device to improve the contrast and image, it is essentially a method which demands a good ability to see in the dark. The pitfalls of fluoroscopic diagnosis

of tuberculosis are faint early infiltrates, thin walled cavities, bilateral symmetrical lesions of the lymphangitic type, and lesions located in the extreme apex. It has been claimed in the past that lighting up of the apices after a short cough is proof of the absence of tuberculosis in this region. However, this lighting up of the apices has been found to be due to purely mechanical factors, such as the downward and outward movement of the first two ribs, and the downward movement of the clavicle. It is easily observable in pneumothorax patients. This movement is prevented by anything that fixes the first two ribs and the clavicle, such as calcification of the costal and vertebral cartilages, and this time honored sign can, therefore, not be taken to exclude tuberculosis.—*Kritsche und Kasuistische Beitrage zum Thema: Roentgendurchleuchtung in der Armee, H. H. Weber, Schweiz. med. Wchnschr., June 19, 1943, 73: 794.*—(*H. Marcus*)

Fluoroscopy in Army.—On being recalled to active duty, an Army brigade of 6,369 men was subjected to fluoroscopy of the chest. The object was to pick up soldiers unfit for military service and direct them to suitable civilian medical attention, to prevent new cases of tuberculosis within the Army, and to lessen the burden of the Army compensation fund. Within two weeks 6,283 men were fluoroscoped with the aid of four fluoroscopic outfits and the same number of experienced physicians. Whenever abnormal conditions were found, standard chest X-ray films were ordered, or the cases were directed to hospitals where they could be suitably worked up. The findings were as follows: 20 cases of active pulmonary tuberculosis, 4 of which showed tubercle bacilli on direct smear; 6 cases of inactive old tuberculosis, excluding those of old pleuritis, healed primary complex and small healed apical foci; 13 eosinophilic lung infiltrations; 8 non-eosinophilic infiltrations; one bronchopneumonia; 3 peribronchitis; one silicosis; and 3 cardiac conditions. Recent experiences with endemics of primary tuberculosis among Army personnel make this type of survey very valuable. The total expenditure was less than $1,200.—*Ergebnis der systematischen Röntgendurchleuchtung einer Heereseinheit zu Beginn des Ablösungsdienstes 1942, C. Frei, Schweiz. med. Wchnschr., June 12, 1943, 73: 778.*—(*H. Marcus*)

Disqualifying Tuberculosis.—Certain types of pulmonary tuberculosis disqualify a man for active service in the Navy. They are presented in order to acquaint the civilian doctor with the present problem and explain why some men have been given a medical discharge and returned to civilian life. Thirty-five millimeter X-ray films are obtained of all men reporting for active duty to determine the existence of any pulmonary disease. Films showing any evidence of (*1*) reinfection type tuberculosis, active or inactive exclusive of slight thickening of the apical pleura, (*2*) active primary tuberculosis, (*3*) inactive primary tuberculosis if the degree or extent of involvement appears to be of present or future clinical significance, (*4*) extensive multiple calcifications in the lung parenchyma and massive calcification at the hilum or (*5*) fibrinous or serofibrinous pleuritis disqualify a man for active service. The next of kin, state or city health officer and local Red Cross are notified so that proper observation and management of the case may be obtained.—*Types of Pulmonary Tuberculosis Which Demand Disqualification for Active Duty in the Navy, C. H Warfield, Radiology, September, 1943, 41: 282.*—(*G. F. Mitchell*)

Induction Examination.—The standards for chest disease, particularly tuberculosis, first prepared by the War Department in August, 1940 have been modified several times. The original concern was that an X-ray examination be made a part of the physical examination in order to exclude active tuberculosis or inactive tuberculosis that might become active, leaving much to the judgment of the examining physician. It became evident that more arbitrary standards should be adopted although allowing acceptance of certain inactive lesions. These standards are both

qualitative and quantitative and require that the nodular or strand-like inactive lesions may not exceed a total of five square centimeters on the conventional 14 x 17 film and that the minimum time to determine inactivity is six months, although other factors, such as age and race, are to be considered. The situation regarding the primary infection is more complex because of two conflicting schools of thought and therefore the following standards were set: "(*a*) Calcified residues of lesions of the intrathoracic lymph nodes, provided none of these exceeds an arbitrary limit of 1.5 cm. in diameter and the total of such lesions does not exceed five. (*b*) Calcified lesions of the pulmonary parenchyma provided the total of these does not exceed ten, and one of these may equal, but not exceed one centimeter in diameter; but none of the remainder may exceed 0.5 centimeter in diameter." These calcified lesions are to be isolated, sharply circumscribed, homogeneous and dense. Following establishment of this standard many decisions were reached mechanically rather than clinically so that in October, 1942 a revision was issued liberalizing the situation and allowing the examining physician to use his discretion when the patient was in good health. The use of these standards, as applied to chest X-ray films, was studied by reviewing a representative percentage of films from each of 89 induction centres where a total of 53,400 chest films had been taken. Most of the lesions considered significant in this review were apical and infraclavicular infiltrates of "soft" appearance and minimal in extent. Rather consistent ratios of significant lesions were found in each of the various service commands, ranging from 5 and 7 per 10,000 in two service commands to 11, 12 and 13 per 10,000 in others, and provide a basis for a reasonably accurate estimate of the number of cases of tuberculosis in the Army. In addition, 173 infiltrates, considered to be inactive lesions of the reinfection type, were also found. This is a ratio of 35 per 10,000 men. The incidence of calcified lesions corresponds to the known pattern of regional differences in the United States, the highest incidence of over 15 per cent being in an area including roughly the central portion of the eastern half of the country. In this area the calcifications were also larger and more extensive than those of men in other parts of the country and there were more cases of disseminated miliary calcifications. Some errors have been uncovered and appropriate steps taken to avoid a repetition of them.—*Physical Examination at Induction, E. R. Long & W. H. Stearns, Radiology, August, 1943, 41: 44.*—(*G. F. Mitchell*)

Tuberculosis in Army.—The Army annual hospital admission rates per 1,000 men in continental United States, calculated for six-month periods, were as follows: January–June, 1941, 1.6; July–December, 1941, 2.0; January–June, 1942, 2.1; July–December, 1942, 1.4; January–June, 1943, 1.3; July–December, 1943, 1.1. These figures compare favorably with those of World War I, when the average admission rate, calculated from the monthly admission rates from April, 1917 to December, 1919, was 13.0. According to Army regulations enlisted men with active tuberculosis are separated from the service. They are transferred to a Veteran's Hospital nearest the tuberculous soldier's home. The average period required for this transfer is about five weeks. During this time spent in an Army station hospital the patients should be educated and informed about tuberculosis. They should learn about the necessity of prolonged treatment and about the importance of bed-rest.—*The Care of Tuberculous Patients Pending Discharge from the Army, Bull. U. S. Army M. Dept., March, 1944, 74: 44.*—(*G. C. Leiner*)

Tuberculosis in Veterans.—In the last war many of the inducted men had incipient tuberculosis which the methods prevalent at that time could not detect. Since the last war there were over 300,000 admissions to the hospitals of the Veterans Administration. The amount paid in disability claims to veterans who developed either service connected or nonservice connected tuberculosis is about

one billion dollars in the last twenty-five years. In spite of the great cost of the Veterans Hospitals and the high grade of medical care given to veterans, the results in these patients have been much poorer than those obtained in private and state sanatoria generally. This is ascribed to the lack of disciplinary control of the patients at the Veterans Hospitals, who frequently leave against the advice of the physicians, before their disease has become arrested. In this way, they not only fail to benefit from the treatment but, on return to their homes, serve as sources of contagion to their families. The author recommends legislation which will discourage the uncontrolled movements of the tuberculous veterans until their disease is arrested. The Veterans Administration should arrange that state and local health officers could follow up these veterans who leave the hospitals and, if necessary, force their isolation from their families. A similar experience with the new crop of tuberculous veterans from the present war can be avoided.—*Tuberculosis among Veterans, L. I. Dublin, Am. J. Pub. Health, December, 1943, 33: 1425.*—(*M. B. Lurie*)

Tuberculosis among Freshman College Students.—A study made recently in 12 eastern and southeastern colleges reveals the fact that 7,452 freshmen students were tuberculin tested and 19.4 per cent of their number showed positive reactions. As in earlier surveys, more male students reacted than did female students. Among the male freshmen, reactors numbered 21.3 per cent, compared to 16.0 per cent among the females. When both sexes are considered, no significant difference is found in the percentage of positive reactions among freshmen who had been graduated from private preparatory schools when compared with those from public high schools. A slightly higher percentage of positive reactions was found among female students from private preparatory schools than among male students who entered college from secondary schools of this type. Positive reactions were more numerous among girl graduates of private schools than among those from public high schools. In the case of male students the percentage of positive reactions was somewhat higher among public high school graduates. The size of the home community of the student seemed to be a negligible factor in the number of positive reactions found. Ten cases of pulmonary tuberculosis were discovered among the 7,368 students included in this survey. Five cases were designated as active and 5 as inactive or healed. In addition, 18 freshmen presented X-ray findings which warranted classification as tuberculosis suspects.—*Tuberculosis Survey of Freshman College Students: A Report from the Tuberculosis Committee of the American Student Health Association, H. D. Lees, Journal-Lancet, April, 1944, 64: 118.*—(*G. C. Leiner*)

Tuberculosis among College Students.—Two hundred and sixty-seven colleges and universities reported a tuberculosis control program for the school year 1942–1943, as compared with 311 for the preceding year. In 51 colleges where tuberculin tests were done with an adequate dosage of tuberculin, among 42,107 students, 18.6 per cent reacted. An incidence of 21.8 per cent had been re ported by a similar group of colleges a yea ago. At 13 colleges and universities, located in midwestern and northwestern states, less than 10 per cent of students gave positive reactions to tuberculin. Five hundred and twenty-two new student cases of tuberculosis were diagnosed at these 267 schools last year, that is, 128.3 new cases per 100,000 enrolled students. In addition, there were found 31 new cases of tuberculosis among food handlers and 42 cases among faculty members, administrative personnel and employees. During 1942–1943, 169 students withdrew from college to undergo treatment for tuberculosis. During the same period, 302 students resumed their college activities having previously been on leave of absence because of this disease.—*Tuberculosis among College Students: Thirteenth Annual Report of the Tuberculosis Committee, American Student Health Association*

for the Academic Year 1942–43, Journal-Lancet, April, 1944, 64: 107.—(G. C. Leiner)

Stereoscopic Photoroentgenology.—The roentgen examination offers the best present method of detecting small minimal tuberculous lesions. The 4 x 5 inch stereoscopic roentgenogram is the most satisfactory for chest surveys. It is more economical and easier to handle than the conventional single 14 x 17 inch roentgenogram and has the same, if not better, diagnostic accuracy. Based on the findings in 10,000 consecutive roentgenograms of chests of men coming for the final type physical examination prior to induction in the United States Army, the incidence of reinfection tuberculosis in a cross section of healthy adult male population between the ages of twenty-one and thirty-five is between 1.2 and 1.35 per cent. Of this group over 50 per cent are active or have an arrested disease. Two-thirds of those with reinfection tuberculosis are not aware of having had the disease. Wide-spread tuberculosis with cavitation can be present without symptoms.—*Ten Thousand Chest Examinations with the Stereoscopic Photoroentgen Unit, J. Levitin, Am. J. Roentgenol., April, 1943, 49: 469.—(W. H. Merrit)*

Early Diagnosis of Pulmonary Tuberculosis.—The importance of early diagnosis of pulmonary tuberculosis is demonstrated by the following figures: 281 tuberculous Sioux Indians had left the Sioux Sanatorium, Rapid City, South Dakota, during the four years of its existence; of 124 patients with minimal tuberculosis, 70 per cent were working, 20 per cent were sick, 6 per cent were dead, 4 per cent were unknown; of 89 moderately advanced cases, 35 per cent were working, 35 per cent were sick, 26 per cent were dead, 4 per cent were unknown; of 68 far advanced cases, one per cent was working, 16 per cent sick, 80 per cent dead, 3 per cent unknown. Seventy to 80 per cent of the sanatorium admissions are still in the far advanced stage. Reasons for late diagnosis are that patients do not consult the physicians early enough and that physicians fail to diagnose cases early enough. The history of contact is of great value. It is stressed that negative physical findings do not exclude tuberculosis. The tuberculin test is of importance when it is positive in the first year of life, and when it is negative in a suspected active tuberculous case in early stages. More sputum examinations, including culture, guinea pig inoculations and stomach washings should be done. The chest X-ray examination is the most reliable aid in diagnosing tuberculosis.—*Early Diagnosis of Pulmonary Tuberculosis, M. K. Mihran, Journal-Lancet, April, 1944, 64: 97.—(G. C. Leiner)*

Ghon's Tubercle.—The term "Ghon's tubercle" has been universally accepted as signifying the calcified single or multiple remnants of a tuberculous lesion resulting from a primary infection acquired in childhood. This interpretation is made regardless of the age of the patient. Ghon examined tuberculous lesions in 184 children by autopsy in St. Anne's Hospital in Vienna. Of that number he described in detail his findings in 125 as to pathological detail, number, size and distribution of the lesions. The oldest patient was fourteen years of age. Ghon made no attempt to apply his findings to tuberculous remnants found in the lungs of adults; apparently it was the wide-spread recognition which his work received, rather than his own interpretation of his findings, which led to a practice of ascribing all calcified foci in the adult to childhood infection. A few authors have pointed out that calcifications are found more frequently in old than in young individuals; in fact, that there is a steady rise in the frequency of such findings with increasing age. This was verified by a case-finding program in which the author participated. In adults the average caseous lesion needs from six to eight years to reach a stage of calcification which makes it recognizable as such on roentgen examination. In childhood the period seems to be much less. With decreasing exposure of children to the tubercle bacillus, especially in some rural areas of the country

the occurrence of late primary infection has undoubtedly increased, but this shift is as yet of little significance in the general picture of tuberculosis epidemiology, especially in the cities. Primary adult infection, therefore, does not offer an explanation for the greater incidence in adults. In recent years, a former student of Ghon, Terplan, pointed out that reinfection can produce typical tuberculous complexes in the lung "heretofore considered as the characteristic sign of primary tuberculosis exclusively." He was not able to differentiate between the remnants of a second infection and the typical primary tuberculous focus. He stated that "the second complex. . . seemed to undergo the same regressive changes with encapsulation and chalky degeneration pointing to complete calcification as the ultimate result." Sweany showed that certainly in the roentgenogram the finished product of either variety is indistinguishable from the other. In numerous examinations by the author of persons known to have been exposed to recent tuberculous infection, mostly by family contact, small, usually caseous lesions were found in the lung fields. Hardly any of these foci had caused symptoms. Some of these small infiltrates were observed to disappear by absorption in the course of a few months or years. Others persisted with slowly progressive encapsulation, deposition of calcium salts and eventual calcification. In a few adults the formation of calcified foci was observed without any known preceding exposure to the organisms which could have caused the lesions by direct exogenous superinfection. In these patients endogenous reinfection can be assumed to be likely. As in Terplan's observations, some of the lesions had developed in addition to preëxisting calcified foci in the lung parenchyma or the tracheobronchial lymph nodes or both, therefore demonstrating their superinfection nature. If the possible superinfection origin of the so-called Ghon's tubercle can be considered as established, it is a step to the speculation that even a child's calcified focus may not be the remnant of a first infection in the strict sense of the word. Instead of the concept of a single inoculation from which primary lesions result, it would be preferable to speak rather of a primary infection period during which several or many inoculations with the tubercle bacillus occur, one of which, but not necessarily the first one, results in the petrified tubercle; in other words, even the true Ghon's tubercle of early life may be the expression of a reinfection superimposed on the truly first lesion which frequently is absorbed, leaving no macroscopical residuals.—*Ghon's Tubercle, R. G. Bloch, Am. J. Roentgenol., April, 1943, 49: 463.—(W. H. Merrit)*

Primary Tuberculosis.—The primary focus is most frequently found in the lung, and the lymph node component in the hilar nodes. When the diagnosis of primary tuberculosis is made, the bipolar lesion can be demonstrated on X-ray films in a large percentage of cases. Usually the primary infection passes without notice, and recovery is the rule. There is considerable controversy on the point if primary tuberculosis is a more dangerous disease in adults than in children, and whether a primary lesion contracted at an early age will immunize the patient against the disease in later life. Neither seems to be the case. The severity of the disease depends more on the length of exposure and the dose of bacilli, and on factors of constitutional resistance than on any other factor. These points have been established on clinical grounds as well as in animal experiments. The rate of infection has decreased considerably in the course of this century so that primary tuberculosis in adults is no longer a rarity. In most countries approximately 50 per cent of the young men entering the Army are found to be Mantoux negative. The usual case of primary tuberculosis will get well without specific treatment. Six to eight weeks bed-rest at home is advised. Such cases should not be sent to sanatoria because they should not be needlessly exposed. The most important single factor is the discovery of the source of the primary tuberculosis and the isolation of the source, if found.—*Primary Pulmonary*

Tuberculosis, F. Murray, Lancet, December 25, 1943, 245: 796.—(H. Marcus)

Basal Tuberculosis.—Lower lobe tuberculosis was found in 1 per cent of 3,103 cases admitted to the Boston Sanatorium. Only 2 of these patients were Negroes, and 3 patients had diabetes mellitus. Twenty-six of the 32 patients were females, a preponderance explained by the fact that their costal type of breathing is less effective than the diaphragmatic breathing of males. There were two types of basal infiltration, a fine nodose (thought to be a direct extension from hilar lymph nodes), and a pneumonic type (probably caused by rupture of a hilar lymph node into a bronchus). Symptoms of the former were like upper-lobe tuberculosis; of the latter like a pneumonia with a high incidence of haemoptysis (18 cases). Twenty-five cases had cavities. Collapse therapy is recommended, pneumothorax or phrenic surgery or both; pneumoperitoneum is a good supplement to phrenic surgery.—*Basal Tuberculosis, J. B. Andosca & J. A. Foley, J. Thoracic Surg., February, 1943, 12: 259.—(W. M. G. Jones)*

Tuberculosis and Pregnancy.—During a nine-year period 29 women were observed who had babies after the date of their first admission for tuberculosis. Three women had minimal tuberculosis, 12 had moderately advanced and 14 had far advanced tuberculosis. Thirty-six babies were born by these women, 34 of these babies are living. Only 4 of the patients were pregnant on admission; one of these died a few months after the birth of the baby. Twenty-five of the women became pregnant after they had been treated and their disease had become quiescent or arrested. It is believed that pregnancy is not harmful to women who have received adequate treatment for tuberculosis.—*Tuberculosis and Pregnancy, E. Hull, New Orleans M. & S. J., January, 1944, 96: 321.—(G. C. Leiner)*

Congenital Heart Disease and Tuberculosis.—Thirteen cases of congenital heart disease, 7 of whom came to autopsy, were found in 1,545 admissions to Sea View Hospital, an incidence of 0.4 per cent. The incidence of pulmonary tuberculosis in congenital heart cases is reported by various authors as ranging from 10 per cent to 80 per cent, Abbott reporting 22 per cent. The authors selected at random from the literature 50 cases of congenital heart disease that had lived past five years of age and on whom complete necropsy reports are available, and found that 2 out of 21 with pulmonary stenosis and one out of 18 with interventricular septal defect succumbed to tuberculosis. Rokitansky observed nearly one hundred years ago that pulmonary tuberculosis and heart disease were incompatible, especially when the heart lesion was associated with cyanosis, as in pulmonary stenosis. The authors believe that their group also supports the theory that persons with pulmonary stenosis are susceptible to pulmonary tuberculosis. Whether they are more likely to develop tuberculosis than individuals with normal hearts is impossible to determine at present, but the cause of death in pulmonary stenosis is easier to determine. Stölker's series of cases of persons living past nineteen years of age showed an equal number died of tuberculosis as of heart disease and Abbott lists twice as many dying a cardiac death as those dying of tuberculosis. In the 50 cases studied from the literature more died from other causes than from tuberculosis. Thus, it is felt that tuberculosis is a hazard, but no greater one than the cardiac defect present. The patients reported in this series were all quite typical cardiac cases as to history and physical findings. Their vital capacities were usually diminished, but within normal limits. The cause of death in all but one (brain tumor) was due to progressive pulmonary tuberculosis. In one case congestive failure was a prominent feature and 2 had subacute bacterial endocarditis of mild form. In 4 of the 13 cases there had been close contact with a case of pulmonary tuberculosis, 2 others had had frequent periods of hospitalization in general wards which may have had an ele-

ment of exposure. The onset of their pulmonary disease was similar to that occurring in patients without heart disease. None reported any noticeable increase in their dyspnoea or cyanosis. No difficulty was experienced in diagnosing tuberculosis as all had had previous diagnosis of cardiac disease and had been frequently examined fluoroscopically prior to the onset of their tuberculosis. But in spite of the frequent examinations all but one were admitted with moderately advanced disease. The longest period of survival was six years, the shortest seven months, the average duration of life after onset of the disease being one to two years. The course in the hospital was similar to other cases of adult type chronic pulmonary tuberculosis. Autopsy revealed gastrointestinal disease in 6 out of the 7 and laryngeal tuberculosis was present in 2 of the 7. Pneumothorax was instituted in 5 and abandoned, but not because of the affect on the heart or dyspnoea. It is believed that the lung in these patients should be the focal point of therapy. If bed-rest is not sufficient, collapse therapy should be instituted in spite of the cardiac lesion and the short life expectancy. The value of such therapy begun late is questionable. While treatment may be hazardous, measures should be instituted to control the disease. Thoracoplasty rather than pneumothorax may possibly be the method of choice because of the selective collapse obtained. Newer operative procedures may be of great value in these patients. It is postulated that physiological changes may add to the predisposition of cardiac patients to tuberculosis. These may include increased oxygen capacity, decreased oxygen saturation, decreased carbon dioxide content, decreased partial pressure of alveolar carbon dioxide and increased arterial pH.—*The Development of Pulmonary Tuberculosis in Congenital Heart Disease, O. Auerbach & M. G. Stemmerman, Am. J. M. Sc., February, 1944, 207: 219.*—(*G. F. Mitchell*)

Generalized Miliary Tuberculosis.—Since the first description of acute generalized miliary tuberculosis (1810) there has been much controversy concerning the pathogenesis of this disease. The main question has been whether the generalized dissemination originated from a softened caseous focus, a vascular focus or from within the thoracic duct. As a matter of fact, the majority of pathologists have accepted the views of Weigert that the dissemination into the blood stream results from the erosion of a vessel wall by an extravascular focus; and its subsequent rupture (vascular focus). Laennec (1810), and later Buhl (1874), found that in the majority of cases of acute generalized miliary tuberculosis there were older caseous foci in the body and suggested these as a source of the disease. Buhl believed that the caseous mass could either erode and enter a small vein or invade the lymphatics. Ponfick (1877) found tubercles within the intima of the thoracic duct and believed these to be the source of the haematogenous spread. Wild (1897) stated that there are too many cases in which a focus cannot be found in a vein or thoracic duct. It was his opinion that small numbers of tubercle bacilli enter the blood stream from an active tuberculous process in the body and that the bacilli multiply in the blood stream. Many years later Loewenstein (1925) insisted that a tubercle bacillus bacteraemia did exist in all forms of tuberculosis. In 1931 Loeschcke asserted that the development of acute miliary tuberculosis was the result of a direct communication between the caseous focus and the blood stream without intermediate tubercle formation. The present author does not accept any of the views so far given that are based on the assumption of the rupture of a tuberculous focus into the blood stream. It is his opinion that the development of acute generalized miliary tuberculosis is the result of the drainage of tubercle bacilli from an active extrapulmonary focus (skeletal system, urogenital system, serous surfaces) or a primary focus (usually progressive) into the lymphatic system. This in turn empties into the venous system through the lymphovenous routes. Microscopical caseous lesions within the tracheobronchial lymph nodes in

chronic pulmonary tuberculosis can also be a source (see below). This conception is based on a study of 297 cases of acute generalized miliary tuberculosis which came to autopsy. Of these, 191 showed varying degrees of chronic pulmonary tuberculosis leaving 106 cases with generalized miliary seeding alone. The preponderance of cases among those with chronic pulmonary tuberculosis is quite the reverse of what is ordinarily reported in the literature. In fact, from Weigert on, most authors have commented on the rareness of acute miliary tuberculosis in those with chronic pulmonary tuberculosis. Perhaps this is due to the (mis)interpretation of the miliary seeding found in the lungs in conjunction with chronic pulmonary tuberculosis as bronchogenic in origin, and the miliary foci in the other organs as terminal haematogenous dissemination from the lungs. In both the combined and uncombined acute generalized miliary tuberculosis, the greatest number of cases was observed in the twenty to thirty-nine age group, which is contrary to the belief that acute generalized miliary tuberculosis is a disease of early youth. Nevertheless there were half as many again cases of the uncombined form in patients under twenty as among the combined form for the same age period. Bone tuberculosis, which occurs chiefly in the younger age group, was found in 48 of the 106 cases (31 of these under twenty); urogenital tuberculosis, preponderant in the older age group, was found in 114 of the 191 combined cases where all but 11 per cent were over twenty. The majority (68 per cent) of the uncombined cases were Negroes, but 64 per cent of the combined cases were whites. The sex distribution was much the same in each group, approximately two to three times as many males being affected as females. Although postprimary tuberculosis (chronic pulmonary) in contrast to primary tuberculosis is usually characterized by the absence of gross caseation of the lymph nodes, an acute tuberculous process was present in one or more organ systems in the majority, and these were almost invariably characterized by caseous tuberculosis of the regional lymph nodes. The lymph node involvement indicates extensive lymphatic drainage of bacilli from the neighboring focus, a phenomenon similar to that observed in any infection. The tubercle bacilli are carried in the lymph to the venous circulation and generalized focalization results. Two important factors must be considered in the consideration of dissemination: (*1*) The caseation may be walled off with no blood stream dissemination. (*2*) After dissemination the caseous focus becomes walled off or even healed. Ample proof of this was seen at autopsy, especially in children in whom the generalization developed secondarily to a primary complex. Haematogenous dissemination was observed in one-third of the cases showing chronic pulmonary tuberculosis without associated extrapulmonary foci. In most instances the caseous foci could be demonstrated within the tracheobronchial lymph nodes on microscopical examination. In a few acute cases the lymph nodes were grossly caseous and in these the haematogenous foci were numerous and widely disseminated. Further propagation of the haematogenous dissemination may occur through the development of ulcerative tuberculous foci in the pulmonary veins. On gross and microscopical examination miliary foci were found in the lungs and spleen in all instances; in the kidney in 205 cases, in the adrenals in 84 cases, in the brain in 31 cases, in the pancreas in 14 cases and in the thyroid in 10 cases. The gross appearance, histological characteristics and serial roentgenograms must all be considered in determining the development and ultimate fate of the miliary tubercle. The only proof of pulmonary seeding is the roentgenogram. Clinical signs and symptoms must be verified by X-ray examination which apparently was generously applied to all these cases. Clear lungs were later seen to show generalized seedings; some lungs, showing a diffuse miliary dissemination, were later seen to clear from below upward only to be again subjected to a second seeding. One case is mentioned which had 4 separate seedings in fifteen months. Not all individuals showed clearing of foci; some showed progres-

sively increasing numbers of miliary foci in subsequent roentgenograms—evidence of further dissemination. The author believes that, with the exception of those who die shortly after their first dissemination, the haematogenous seedings are usually multiple. The gross appearance, distribution, size and microscopical appearance of the foci in the different organs is discussed. Healing is described and correlated with the X-ray appearance. The usual concept that the concomitant presence of chronic pulmonary tuberculosis and acute generalized miliary tuberculosis is very rare, is not confirmed by this study. As previously menitoned this combination occurred in 64 per cent of the cases presented.—*Acute Generalized Miliary Tuberculosis, O. Auerbach, Am. J. Path., January, 1944, 20: 121.*—(*J. S. Woolley*)

Pulmonary Tuberculosis in Paretics.—Four varied cases of coexisting pulmonary tuberculosis and *dementia paralytica* are presented to show their striking similarity to a fifth case which might be classified as syphilis of the lung according to accepted standards. In psychotic patients, animal inoculations with early morning gastric lavage specimens are essential in establishing or eliminating the diagnosis of pulmonary tuberculosis, when other simpler tests are unavailing. The therapeutic test for syphilis of the lung is not specific. Accurate criteria for the antemortem diagnosis of syphilis of the lungs are not available.—*Pulmonary Tuberculosis in Paretic Patients: Its Resemblance to Clinical Pulmonary Syphilis, L. Munson, M. Bull. Vet. Admin., January, 1944, 20: 305.*—(*G. C. Leiner*)

Bronchiectasis Caused by Bronchial Tuberculosis.—A case without parenchymal tuberculosis is presented showing the development of bronchiectasis in an upper lobe as a direct result of partial bronchial obstruction. The bronchial tuberculosis healed, the sputum became negative, but the bronchiectasis remained and was cured by lobectomy. The pathological specimen showed irregular bronchiectatic cavities and bronchial stenoses. Giant cell tubercles were present but no tubercle bacilli could be demonstrated. Bronchiectasis produced in this way can develop quite rapidly. Former concept was that the bronchiectasis seen in tuberculosis was caused by slowly developing fibrosis, that is, as an end-result of healed chronic pulmonary tuberculosis.—*Tuberculous Endobronchitis and Upper Lobe Bronchiectasis, A. F. Aufses, J. Thoracic Surg., February, 1943, 12: 285.*—(*W. M. G. Jones*)

Artificial Pneumothorax.—The author points out that at present pneumothorax may mean anything—an effective or an ineffective collapse; with complementary pneumonolysis or without; combined with bed-rest or without—and hence pneumothorax statistics are valueless. When the term "pneumothorax" means an effective well managed collapse it will not only save many lives and avoid many tragedies but statistics on series of cases will have a definite value. To be effective all cases of ineffective pneumothorax must be promptly recognized (after the third or fourth refill) and either made effective by pneumonolysis or immediately abandoned and other collapse measures used. To be well managed serious complications may be avoided by proper selection of cases and observance of a few simple rules. In the first place there are five types of cases in which pneumothorax therapy is apt to be ineffectual or dangerous: (*1*) In fibrous disease, especially when extensive, effective collapse is unlikely. Moreover fibrous scarring prevents reëxpansion or does so with marked mediastinal shift which in turn leads to emphysema of the good lung. (*2*) In acute pneumonic tuberculosis the danger of acute empyema is great and it seems wise to wait a few weeks or months for subsidence of the infection. (*3*) When permanent collapse is needed a method giving permanent results is to be used. This applies to large apical cavities or to those with extensive excavation throughout one lung. By pneumothorax, cavity closure in these cases is most unlikely and empyema is invited. (*4*) In

the presence of bronchostenosis pneumothorax may convert a partial stenosis into a complete occlusion, and atelectasis, anaerobic lung infection and empyema are common sequels. (*5*) When there is active tracheobronchial disease pneumothorax should be withheld. Every effort must be made to diagnose this condition which may be suspected when there is positive sputum without obvious source, cyanosis and dyspnoea without obvious cause, marked variations in the daily sputum, symptoms out of proportion to evident disease, the presence of atelectasis in the X-ray film, hilar flares, and the presence of a wheeze. Only limited cases that respond promptly to bronchoscopic treatment (30 per cent silver nitrate) may be given pneumothorax with safety. The rules for management of pneumothorax are: (*1*) The greatest emphasis must be placed on the early abandonment of ineffective pneumothorax. The recognition of this principle alone will vastly improve the results of pneumothorax therapy. Pneumothorax is not a neutral agent, but is often extremely dangerous. Merely to create an unsatisfactory pneumothorax pocket increases the risk by 25 per cent. A fatality rate of 66 per cent has been found in those with an unsatisfactory space as compared with a rate of 42 per cent in those with no space at all, and a 4 per cent rate for cases with a satisfactory space. Ineffective pneumothorax does not control parenchymal disease, invites pleural infection and spread to the good lung, and it wastes valuable time. (*2*) If an ineffective collapse can be made effective by a pneumonolysis, no time should be wasted. The thoracoscopic examination should be done as soon as there is sufficient space. If division of adhesions is inadvisable the pneumothorax should be abandoned at once. A very extensive pneumonolysis, as well as the division of adhesions over large peripheral cavities, is considered inadvisable. (*3*) Effective collapse (selective collapse) can only be obtained by the use of small frequent refills without compression of healthy lung. Rapid or marked reduction in lung volume is dangerous. (*4*) When selective collapse fails to close cavities (tension cavities) reëxpansion is indicated as many of these cavities will close promptly with reëxpansion. (*5*) Pneumothorax should be terminated when the disease is judged to be healed. This is the only way to avoid terminal unexpandable lung or harmful mediastinal shift. In summary, most complications of pneumothorax can be ascribed to faulty choice of patients or to poor management. The complications will be minimal when the choice of patients is right and when ineffective pneumothorax is abandoned quickly or made effective by judicious pneumonolysis. The following minimal standards for statistical studies are also recommended: (*1*) Pneumothorax shall be combined with sanatorium care. (*2*) Collapse must be effective or made so. (*3*) Ineffective collapse must be abandoned immediately and other measures substituted for it. Under these rules the term pneumothorax will automatically connote an effective well managed therapeutic measure.—*Artificial Pneumothorax, T. N. Rafferty, J. Thoracic Surg., August, 1943, 12: 578.*—(*W. M. G. Jones*)